

NOTES ON AUSTRALIAN MOSQUITOES (DIPTERA, CULICIDAE).

PART V. THE GENUS *ARMIGERES* AND NEW SPECIES OF *ARMIGERES*, *THEOBALDIA* AND *CULEX*.*

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(Twenty-two Text-figures.)

[Read 29th November, 1944.]

THE AUSTRALASIAN MEMBERS OF THE GENUS *ARMIGERES*.

Species of the genus *Armigeres* found in the Australasian Region have long been subject to misidentification. Recent collections from New Guinea have assisted in bringing clarity to the problems involved, but even so, some points still remain in question concerning the species to be found east and west of New Guinea. It is hoped, however, that publication of present findings may stimulate interest in supplying the obvious lacunae.

At various times the following species of *Armigeres* have been recorded from New Guinea or islands eastwards: *A. obturbans* (Walk.); *A. obturbans* (Walk.) var.? (Edwards, 1924); *A. lacuum* Edw., *A. malayi* Theo., *A. breinli* (Tayl.) and *A. denbesteni* Brug. Of these, however, only the records of *A. lacuum*, *A. breinli* and *A. obturbans* var.? are adequately substantiated, and of these the last constitutes a new species which is herein described. *A. denbesteni* and *A. malayi* are both recorded as occurring on New Guinea by Bonne-Wepster (1938, p. 207) but specific localities are not given. It may reasonably be assumed that the inclusion of *A. malayi* in this author's list of New Guinea species is merely a repetition of an older error and, if *A. denbesteni* is validly included, that it has only been found in Dutch New Guinea.†

The genus is not known to occur on the Australian mainland and it would be of considerable interest to establish the eastern limits of its distribution on islands of the Pacific. As far as information available to me discloses, the genus occurs eastward to the Solomon Islands.

ARMIGERES MILNENSIS, n. sp.

I have examined the genitalia preparation referred to by Edwards (1924, p. 368) under *Armigeres obturbans* (Walk.) var.? and found it identical with that of the species described below, which also came from the same locality.

Types: Holotype male, allotype female, one male and six female paratypes together with a series of morphotype larvae, all a bred series from Milne Bay collected by D. A. C. Cameron. These have been lodged in the Museum of the Division of Economic Entomology, Council for Scientific and Industrial Research, Canberra, A.C.T.

DESCRIPTION.

Male.

Head. The head is bordered with flat pale scales around the eyes, broadening to distinct patches laterally. These pale scales surround a dark-scaled central area, but a few pale scales are also present on either side of the median dorsal line. The clypeus is dark brown; the palpi are longer than the proboscis, and both are clothed with dark scales. The pedicels of the antennae are clothed with loosely applied flat pale scales; the flagella are normally plumose and the last two segments are very considerably elongated.

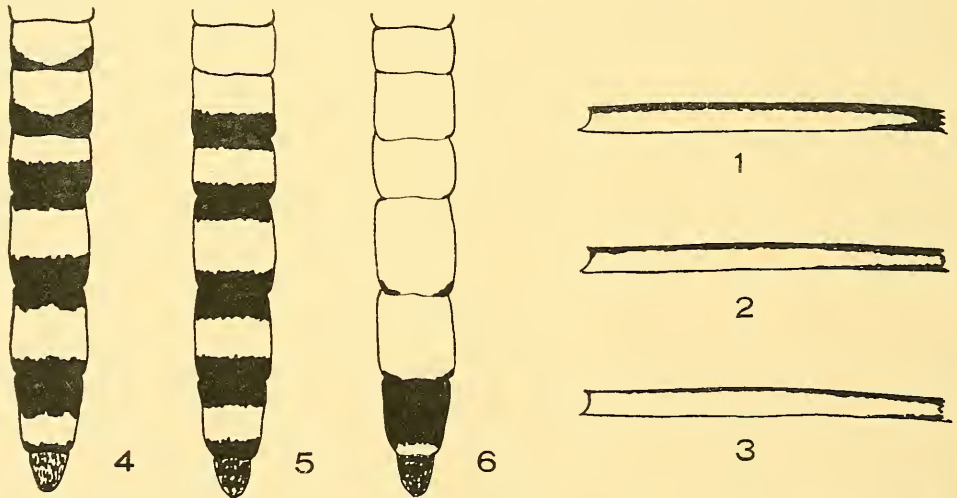
* Continued from these PROCEEDINGS, lxii, 1937, 294.

† *A. spathulatus* Brug (1939, p. 101) has recently been described from Ceram, but there is nothing in the description to indicate that it is really distinct from *A. denbesteni*, except that there are no lateral pale patches on the head. As the description is from a single reared male specimen, it would be unwise to consider such a difference as of value without further corroborative evidence. Furthermore, the remarks comparing this species with *A. obturbans*, included in the description, do not tally with the description of *A. obturbans* given by Bonne-Wepster and Brug (1937, pp. 15-17). So, lacking an adequate description of the type (which was placed in the British Museum), I considered it unwise to attempt to include it in the key to species.

Thorax. Dorsally the scutum is very dark brown and clothed with bronzy, dark brown, narrow curved scales, but there is a narrow line of pale scales along the anterior margin broadening to a distinct silvery lateral stripe which extends to the level of the base of the wing. There are also some pale scales in the triangular area before the base of the scutellum, and also centrally and laterally on the scutellum itself. No central or dorso-central bristles are obvious on the scutum, giving it a rather sleek appearance. Laterally the pronotal lobes and the posterior pronotum are clothed with rather loose white scales, whereas there are closely applied dense white scales over much of the sternopleuron, mesepimeron and postspiracular areas. Spiracular bristles are absent but postspiraculars are present. The propleuron is largely pale-scaled and also bears a group of pale brown bristles. The postnotum is brown and bare, and the halteres comprise a pale stem and dark knob.

Legs. The coxae of all legs have distinct patches of pale scales anteriorly. The femora of all legs are dark-scaled above and pale beneath. Those of the hind-legs are pale from the base on the outer lateral surface nearly to the apex (see Fig. 1). The apex is, however, always dark-scaled. The tibiae and tarsi of all legs are entirely dark-scaled. The legs are spinose and this is particularly noticeable on the tibiae and first tarsi.

Wings. The costa, sub-costa and radius are clothed with broad, dark scales; the scaling of the rest of the wing veins is also dark but less obvious; the base of the upper fork cell is nearer the apex of the wing than the base of the lower fork cell.



Figs. 1-6.—Outer surface of hind femora and venter of abdomen of various species of *Armigeres*. 1 and 4. *A. milnensis*. 2 and 5. *A. brevili*. 3 and 6. *A. lacuum*. Figs. 1-3, $\times 14$, and 4-6 $\times 17$.

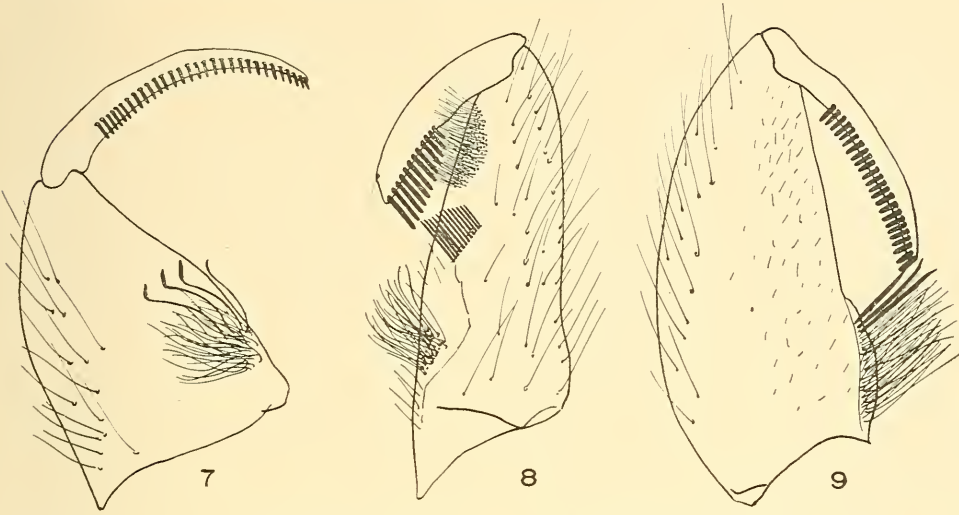
The anterior and middle cross-veins are in a line and distal to the posterior cross-vein. The alula has a fringe of dark scales and the squame is fringed with hairs.

Abdomen. As in related species, the abdomen is clothed dorsally with closely applied overlapping broad dark scales which are iridescent in some lights and give a distinct velvety appearance. Segment VIII has a patch of white scales basally on the dorsum.

The tergites have rather triangular, lateral patches of pale scales on all segments but these are seldom visible dorsally. The venter (Fig. 4) has segment I pale; segment II is largely pale-scaled, but with an irregular scattering of dark scales, particularly distally. Segment III is pale-scaled basally, dark distally, and segment IV is similar; segments V, VI and VII are dark both basally and apically with a central pale band; segment VIII is largely pale basally and dark along the distal margin.

Genitalia (Fig. 7). The coxites are tapering; the basal lobes are clothed with long hairs which are slightly thickened, and the most distal three or four are more strongly

developed, and both curved and clubbed. The style bears a long row of equal teeth, from 27 to 30 in number, extending from the apex almost to the base of the style. There is no comb present on the distal portion of the coxite.



Figs. 7-9.—Coxite and style of various species of *Armigeres*, all $\times 126$. 7. *A. milnensis*. 8. *A. breinli*. 9. *A. lacuum*.

Female.

Apart from sexual differences, the female is essentially similar to the male. The palpi are scarcely a quarter the length of the proboscis and dark-scaled. There are usually no more than two or three pale scales on the central dark area of the head and these are quite irregular. The pale scaling on the scutellum is also irregular and may be absent. The basal pale band dorsally on segment VIII of the abdomen covers the greater part of the tergite.

Larva.

The larvae of this species conform in general details to other members of the genus. The head (Fig. 10) is round, with short, stout antennae; the antennal shaft hair is very minute and situated at about the middle of the antenna; head hair A is bifid or trifid, B is simple, and C has one to four branches; hairs A, C and f are very finely frayed.

The lateral comb of the eighth segment consists of ten or eleven fringed scales (Fig. 12). The first pentad hair is minute and multi-branched; the second is also minute with three or more fine branches, the third is strong and obvious, with five or six plumose branches, and the fifth is strong and simple.

The siphon is short and stout with a minute three- or four-branched dorso-lateral hair. No ventro-lateral tufts or pecten are present. The saddle of the anal segment scarcely covers the dorsal half of the segment. There is a minute branched saddle hair and the anal papillae are very large, between three and four times the length of the anal segment and sausage-shaped. There are five minutely plumose hairs in the dorsal sub-caudal tuft and three similar hairs in the ventral sub-caudal tuft. No grid is present and the hairs of the ventral brush are also minutely plumose. The terminal segments are illustrated in Fig. 11.

Distribution.—Apart from the type locality (Milne Bay) where this species is common, specimens have been examined from Lae, Lalapipi, Bulldog, the Mekeo district and the Lakekamu Goldfield.

ARMIGERES BREINLI (Taylor).

Armigeres breinli (Tayl.) 1914, *Trans. Ent. Soc. Lond.*, 1914, 186 (as *Neosquamomyia breinli*).

Types: As the female was described first, the type of this sex may be considered the holotype. The specimen is No. 235 in the Collection of the School of Public Health and Tropical Medicine, University of Sydney. The specimen designated as type male (No. 234) is not conspecific with the female type nor does it conform to the original description of the male. The genitalia are absent from this specimen and it is obviously the one referred to by Edwards (see note below). Furthermore, there are no scales on the clypeus and the white line on the outer side of the hind femora does not extend to the apex. It is, then, a specimen of *A. milnensis*, n. sp. described above. As no real allotype exists for *A. breinli*, I have designated a specimen from Milne Bay as such and lodged it in the C.S.I.R. Museum, Canberra, A.C.T., together with a series of both sexes and associated larvae which have formed part of the material on which this revision is based.

Note: Edwards (1924, p. 368) mentions that he has examined a slide prepared by Hill, allegedly from the type male of *A. breinli*, but that it was obviously not the one described by Taylor. This slide still exists labelled as type male of *A. breinli* in the Slide Collection of the Council for Scientific and Industrial Research, Division of Economic Entomology, Canberra, A.C.T. It is the one referred to above under *A. milnensis*.

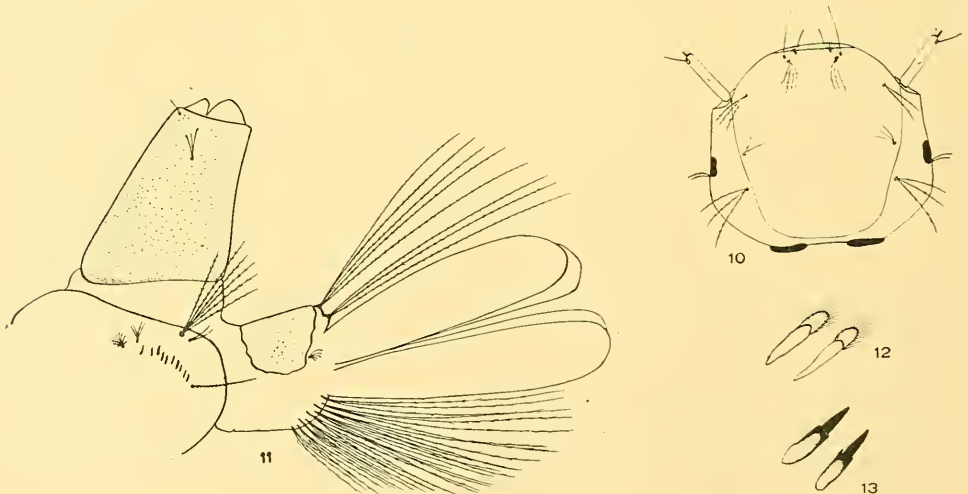
Type Locality: Not expressly stated in original description, but that of the type female was Milne Bay and that of the type male originally designated, Lakekamu Goldfield. The allotype male designated by me is topotypical with the holotype female.

DESCRIPTION.

Taylor's original description of this species is adequate except that it should be noted that the hind femora are white to the apex of the outer side (Fig. 2) and segment VII of the female abdomen is pale basally (not apically). In the male as well, a few pale scales may at times be seen basally, if the abdomen is extended. Frequently a very few pale scales may be scattered irregularly on the dorsum of segment VI. The venter has the first two segments pale-scaled, segment III with a broad apical dark band, IV, V, VI and VII with narrow basal dark band, broad central pale band and apical dark band, and VIII is rather indefinitely mottled or dark (see Fig. 8).

Male.

The characters mentioned above apply equally to the male. The genitalia (Fig. 8) have the basal lobe invested with long hairs. At about the middle of the coxite is a



Figs. 10-13.—Larval characters of *Armigeres*. 10, Dorsal view of head of *A. milnensis*, $\times 26$. 11, Terminal segments of *A. milnensis*, $\times 26$. 12, Lateral comb scales of *A. milnensis*, $\times 185$. 13, Lateral comb scales of *A. breinli*, $\times 185$.

row of stout spines resembling a comb comprising about twelve teeth. The style has a tapering row of teeth the apical one being longest; about nine are present in all.

Larva.

The larva of this species is very similar to that of *A. milnensis* but may be distinguished on certain characters of the terminal segments. In particular, the lateral comb (Fig. 13) comprises about nine pointed teeth, which may bear a few minute spines at the base of the main central tooth, but they are never fringed; there are also fewer hairs in the third pentad hair, usually three or four.

This species obviously comes very close to *A. malayi*, but may be distinguished in both sexes by the venter (in *A. malayi* this is entirely white on segments I-VII), and in the male the spines on the style taper more evenly (in *A. malayi* the apical tooth is very much longer than the preceding one and there are more teeth; about sixteen).

Distribution.—Originally described from Milne Bay. Specimens have been examined from Milne Bay, Lae, Dobadura and Oro Bay. It is also recorded from Fak-fak, Dutch New Guinea (Brug, 1934, p. 514).

ARMIGERES LACUUM Edwards.

Edwards, F. W., 1922, *Bull. ent. Res.*, xiii, 97.

Types: Type male deposited in Budapest Museum. (Paratypes were deposited in the same museum and in the British Museum, but it will be shown below that these are unlikely to be conspecific.

Type Locality: Ile des Lacs (East of New Guinea). Nowadays this island is known as Garove, one of the Vitu Islands.

Material Examined: I have based my conception of this species on a series of specimens collected by G. F. Hill from New Britain. These specimens were determined as *A. lacuum* by Edwards and returned to Hill. They are part of the material referred to by Edwards (1923, p. 6).

DESCRIPTION.

Female.

The characters which serve to distinguish this species are as follows: The clypeus is without scales, the venter (Fig. 6) is almost entirely white with the exception of sternite VII, and the hind femur is white, on the outer lateral surface, to the apex (Fig. 3).

Male.

The male agrees in the above characters. The genitalia (Fig. 9) are distinctive in having the basal lobe of the coxite covered with long fine hairs, the most distal three to five of these being thickened. The style bears 20-21 teeth on about the distal three-quarters.

Larva.

The larva of this species has been figured by Hill (1925, Plate vi, fig. 12), but the details given are inadequate to differentiate the species from *A. milnensis* in the larval stage. The lateral comb teeth are fringed so that the species may be distinguished from either *A. breinli* or *A. malayi*. In Hill's figure a strong branched hair is shown anteriorly to the lateral comb. Such a hair is to be found in all fourth stage larvae of species of this genus and is the developing pupal hair found at the postero-lateral corner of the eighth segment. This hair will not, of course, be found in cast skins.

Distribution.—*A. lacuum* was first found on Garove and has since been recorded from New Britain (Toma, Beining district and Rabaul). It has not been found on New Guinea.

Note: In Edward's original description he notes that it is possible that the males and female of the type series may not be conspecific. The male is the holotype and should be taken as the basis of this species. Some, if not all, of the female paratypes, are obviously a distinct species since, in contrast to the holotype, there are patches of scales on the clypeus, a character which, on available evidence, must be considered distinctly valuable. Re-examination of the type series is necessary before it can be

decided whether this other species is *A. breinli*, *A. malayi* or an undescribed species. The only evidence available to me comes from a pair of female specimens collected by Dr. G. A. M. Heydon on Bougainville. These have the clypeus scaled, the hind femora white on the outer surface right to the apex, and the venter is almost entirely pale-scaled but has very narrow apical dark bands on sternites IV-VII. These are somewhat broader laterally and on the anterior segment (II and III) only the lateral patches of dark scales are present on the sternites. *Armigeres lacuum* of Bonne-Wepster and Brug (1937, p. 19) is a case of mistaken identification as their description and figures in no way apply to *A. lacuum* as described by Edwards (male only) or as interpreted above for both sexes.

ARMIGERES DENBESTENI Brug.

Brug, S. L., 1925, *Bull. ent. Res.*, xv, 345-7.

Types: Holotype male and paratypes of both sexes, and larvae, in the British Museum.

Type Locality: Western part of Ceram.

The principal differential characters of this species are as follows: The hind femora are pale on the outer lateral surface to the apex, the basal sternites are wholly pale and sternites III (or IV) to VI are largely pale with a narrow black apical border, and V and VI have a narrow black basal border as well; VII is black with a narrow white sub-apical band, and VIII may be wholly black or pale basally.

Genitalia. The male genitalia are distinctive. The basal lobe of the coxite bears a tuft of hairs at its base and three strong spatulate spines above. The style is curved, and has a row of about nine unequal teeth apically. The apical tooth is the longest and the rest are of progressively decreasing size to the most proximal.

The larva, in common with *A. milnensis* and *A. lacuum*, has the comb scales fringed, but no further differential characters can be gleaned from the description.

Distribution.—Only known with certainty from Ceram and Saparoea.

Key to Australasian Species of *Armigeres*.

1. Clypeus with lateral patches of silver scales dorsally; hind femora white to apex on outer lateral surface; venter with broad apical dark band on segment III *A. breinli*
Clypeus without scales, hind femora and venter various 2
2. Venter pale-scaled except on sternite VII; hind femora pale to apex on outer lateral surface *A. lacuum*
Venter with obvious dark bands at junctions of segments 3
3. Hind femora pale to apex on outer lateral surface, sternite VII black except for narrow sub-apical pale band *A. denbesteni*
Hind femora with pale band on outer lateral surface terminating before apex; sternite VII with well-marked central pale band *A. milnensis*

The above key will serve to distinguish specimens of both sexes, but confirmation of identification may be obtained by examination of the male genitalia.

THEOBALDIA ATRA, n. sp.*

Types: Holotype female, allotype male, one male and eight female paratypes in the Western Australian Museum, Perth, two male and eight female paratypes in the collection of the Western Australian Department of Agriculture and two male and four female paratypes in the C.S.I.R. Museum, Canberra, A.C.T. All the specimens constitute a series bred from larvae by P. N. Forte.

Type Locality: Perth, Western Australia.

DESCRIPTION.

Female.

Head. The head has a border of pale, narrow curved scales in front along the eye margins, lateral patches of flat pale scales, and dorsally very narrow elongate dark brown upright forked scales are intermingled with a few narrow curved pale scales. The antennae are almost as long as the proboscis, the pedicels and flagella are dark brown; the verticillate hairs are also dark brown. The clypeus is dark brown, the palpi

* Freeborn and Brockman in "Identification Guide to the Mosquitoes of the Pacific Coast States", United States Public Health Service, 1943, regard the generic name *Theobaldia* as invalid and have replaced it by *Culiseta*. The evidence on which this change is based is not available to me so for the present I have retained the more widely used name.

and proboscis are clothed with dark brown scales; the labella are yellowish; the palpi are only about one-tenth the length of the proboscis.

Thorax. The mesonotum is dark brown, clothed with black bristles and sparse fine dark bronzy-brown, hair-like scales. The scutellum is also dark brown with a few pale, narrow curved scales and six or seven long black border bristles on the mid-lobe; there are usually seven similar bristles on the lateral lobes. The postnotum is dark brown. The pronotal lobes are dark brown, and clothed with black bristles and hairs only. The posterior pronotum is dark brown. The rest of the pleurites are brown to dark brown; two to four strong black spiracular bristles are present; the post-spiracular area is bare; there is a continuous row of black bristles and hairs along the posterior border of the sternopleuron, mingled with a few scattered pale scales and at least one of the bristles in the lower sternopleural position is longer and stronger than the rest. One strong, and one weak lower mesepimeral bristle is present, and there are also a group of pre-alar and sub-alar bristles. The propleuron carries a tuft of six or more strong dark bristles. The halteres are light brown to dark brown.

Legs. The coxae and trochanters are brown, the fore coxae are clothed with dark brown scales anteriorly, the hind coxae with pale yellowish scales laterally, the rest of the legs are entirely dark-scaled, except for the under surface of the femora.

Wings. The wings are entirely clothed with dark brown scales. These are rather broader and more close-set on the costa, sub-costa, R_1 and Cu_1 . The upper fork cell is about five times as long as its stem, with its base considerably nearer the base of the wing than that of the lower fork cell, the stem of which is about two-thirds the length of the cell. The under surface of the base of the sub-costa (proximal to the humeral cross-vein) bears a tuft of hairs.

Abdomen. Dorsally the abdomen is clothed with black scales with violet reflections in some lights, and the venter is clothed with pale yellowish scales. It is hairy both dorsally and laterally.

Male.

Essentially the male is similar to the female except that the antennae are plumose; the palpi are longer than the proboscis by about half the apical segment; the antennae are about three-quarters the length of the proboscis. They are clothed with dark scales and hairs except for indistinct ventral patches of pale scales on segments II and III. There are also considerably fewer upright forked scales on the dorsal surface of the head.

Genitalia (Fig. 14). The coxites are long and tapering with their basal lobes rather small and hairy, but with a rather dark strongly spinose area dorsally near the base. The styles are straight, tapering, with a rather prominent terminal peg. The tenth sternites are strongly chitinized, terminating in three strong curved teeth; the phallosome is chitinized and similar to that of *T. inconspicua*. The lobes of the ninth tergite have three or four spines on each lobe.

Note: Although the Australian species of the genus *Theobaldia* are quite distinctive in characters of the male genitalia, the separation of females is undoubtedly difficult. In the present case it should prove fairly easy to recognize *Theobaldia atra* by its dark, well-developed spiracular bristles and the generally darker thoracic integument. The rest of the Australian species have fine, pale and inconspicuous spiracular bristles, and light brown or reddish thoracic integument.

CULEX POSTSPIRACULOSUS, n. sp.

Types: Holotype male, allotype female, one paratype of each sex, together with associated larval and pupal skins and a morphotype larva, all lodged in the C.S.I.R. Museum, Canberra, A.C.T.

Type locality: Narrabeen, N.S.W.

Male.

Head. Dorsally, the head is clothed with pale narrow curved scales intermingled with black upright forked scales giving place along the anterior border to brown, narrow, curved scales, and laterally to patches of flat pale scales. The antennae are normally

plumose and almost as long as the proboscis. The pedicels of the antennae are dark brown; flagellar segments I-XI are pale with dark brown rings at the bases of the verticillate hairs and the last two segments are elongate and dark brown. The palpi are longer than the proboscis by almost the whole of the two apical segments; they are dark brown scaled with pale junctions to the segments, and distinctly hairy from the distal half of the third segment to the apex. The proboscis is dark brown scaled with a rather indefinite pale scaled area, more readily visible from the undersurface, just beyond midway.

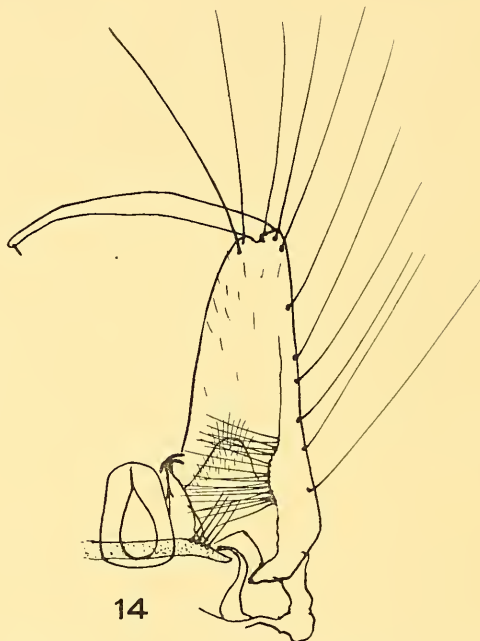


Fig. 14.—Genitalia of *Theobaldia atra*, $\times 197$.

Thorax. The scutal integument is dark brown, covered with bronzy-brown, narrow, curved scales and black bristles. The scutellum is dark brown, with groups of narrow curved golden-brown scales on the mid and lateral lobes; the border bristles are black. The postnotum is dark brown. The pleurae are completely dark brown; the pronotal lobes bear black bristles; the posterior pronotum has a posterior row of six or seven black bristles and a few bronzy-brown narrow scales. The propleuron bears a dense tuft of black bristles. There are at least two, often four, obvious postspiracular bristles; the sternopleuron bears a posterior row of brown bristles with one considerably stronger and longer black one about midway; there are a few pale silvery flat scales amongst the lower and upper sternopleural bristles. The pre-alar tuft comprises black bristles. The mesepimeron is bare in its lower region but has a tuft of pale sub-alar hairs mingled with a few pale scales.

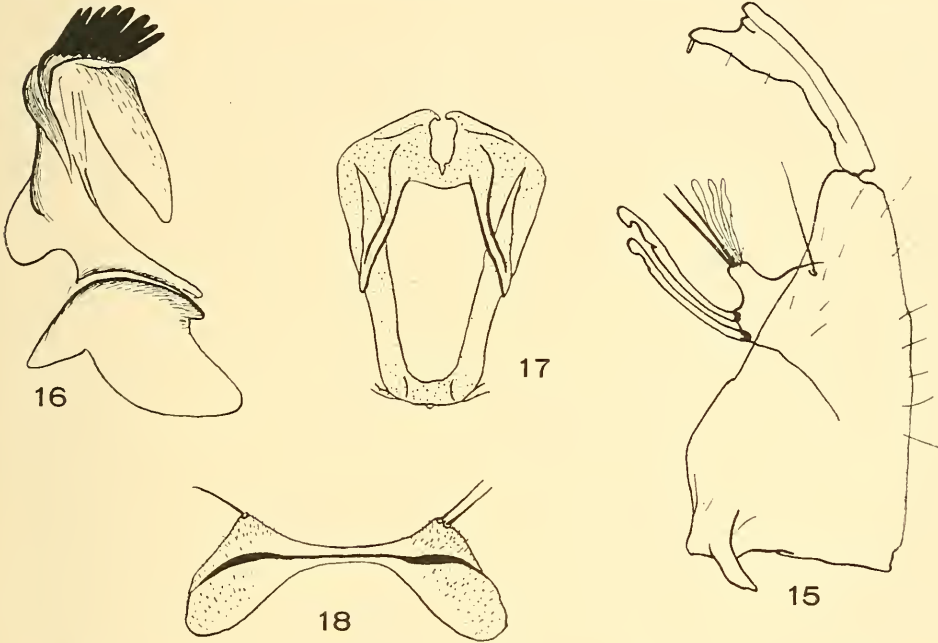
The halteres are yellowish-brown stemmed with darker knob.

Legs. The coxae and trochanters are dark brown. The rest of the legs are largely dark-scaled, except that on the forelegs there are narrow, pale basal bands on tarsal segments II and III; on the mid-legs, tarsi I, II and III have narrow pale basal rings; on the hind-legs similar rings are obvious at the bases of segments I-IV; the junctions on the femora and tibiae on all legs are pale-scaled.

Wings. The wing is clothed with dark brown scales; the upper fork cell is only very slightly longer than its stem, and the lower fork cell slightly shorter than its stem; their bases are equidistant from the base of the wing. The upper and middle cross-veins are in line with one another and distinctly distal to the lower cross-vein.

Abdomen. Segment I is dark brown; segment II has a sub-basal narrow pale band; the rest of the abdomen is black scaled with straight basal pale bands on each segment and long, fairly dense hairs laterally and apically on each segment. Ventrally the abdomen is dark brown scaled with lateral lines of pale scales on the apical segments.

Genitalia (Figs. 15-18). The coxites are broad at the base, narrowing rather sharply to the apex. There is an apical lobe divided into two sections bearing modified spines as illustrated in Fig. 15, and the style is distended apically. Fig. 16 shows the form of the tenth sternite, Fig. 17 the phallosome and Fig. 18 the ninth tergite.



Figs. 15-18.—Structures of the genitalia of *Culex postspiraculosus*. 15. Coxite and style, $\times 160$. 16. Tenth sternite, $\times 1080$. 17. Phallosome, $\times 1080$. 18. Ninth tergite, $\times 1080$.

Female.

Head. The head is dark brown with a median patch of pale narrow curved scales anteriorly and smaller brown narrow curved scales behind. There are lateral patches of flat pale scales, and a few pale scales are to be found anteriorly at the eye junction. The upright forked scales are very dark and numerous. The pedicels are dark brown, the antennae are dark brown with dark verticillate hairs and lighter, fine, short clothing hairs. The clypeus is dark brown and the palpi, which are about one-seventh the length of the proboscis, are black-scaled with a few pale scales at the tip.

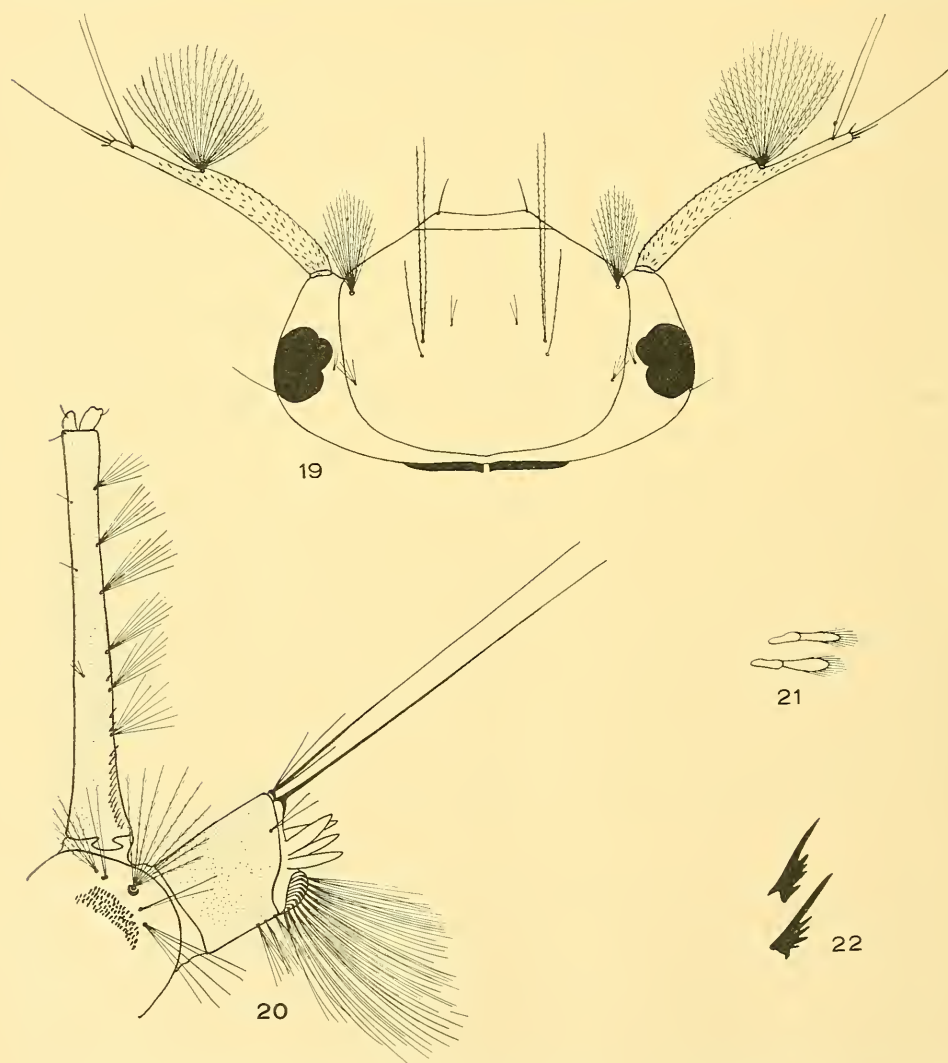
The proboscis is brown beneath the palpi, thence to about one-third from the tip pale-scaled, and the apical third is black. The pale-scaled area is somewhat more marked ventrally.

Thorax. The scutum is dark brown and clothed with small bronzy narrow curved scales; the scutellum is almost black with some narrow curved bronzy scales on the mid and lateral lobes. The bristles of the scutum and the border bristles of the scutellum are black. The postnotum is brown. The pronotal lobes are dark brown with black bristles; the posterior pronotum has bronzy narrow curved scales dorsally and posteriorly and black posterior bristles. The pleurae are uniformly dark brown. Spiracular bristles are absent, but the postspiracular area carries a group of four or five bristles and a few pale scales. There are tufts of pale scales among the lower and upper sternopleural bristles. Lower mesepimeral bristles are absent, but uppers are numerous and pale, and intermingled with a few pale scales.

Legs. The fore and mid coxae have a few pale scales near their base. The femora are pale-scaled beneath almost to the tip, otherwise they are dark-scaled, but with a few pale scales at their apices forming a small knee-spot. The tibiae are dark-scaled. There is a narrow ring of pale scales at the bases of segments II, III and IV of the tarsi of the fore- and mid-legs. The hind-legs have narrow basal pale rings on segments I-IV. Pulvilli are present and obvious.

Wings. The costa, subcosta, R_1 , the base of the media, the greater part of the cubitus and the base of the anal vein are clothed with flat, broad dark scales; the rest of the wing veins bear elongate dark scales. The first fork cell is narrower and longer than the second, its base slightly nearer to the base of the wing than that of the second. The stem of the first fork cell is a little more than half the length of the cell and that of the second is almost as long as its cell. The squames have a dense fringe.

Abdomen. The abdomen is dark, the first segment has a few dark scales at the centre, segments II-VIII have basal bands of pale scales but are otherwise black-scaled. The pale bands on segments II-IV are practically straight, on V and VI slightly produced



Figs. 19-22.—Larval structures of *Culex postspiraculosus*. 19. Dorsal view of head, $\times 32$. 20. Terminal segments, $\times 32$. 21. Lateral comb scales, $\times 200$. 22. Pecten spines, $\times 200$.

in the middle, and on VII and VIII they are again straight. There are also a few pale scales at the lateral borders of the tergites, these forming pronounced patches continuous with the dorsal bands on segments VI and VII. The venter is clothed with black scales, but there are basal patches of pale scales laterally.

Larva.

The larva of *C. postspiraculosus* is a very dark, long-siphoned one, which is rather obvious when alive because of the white central area of the antennae contrasting markedly with the general black colouration.

Head (Fig. 19). The head is dark; the antennae are dark at the base and beyond the shaft-hair, but pale in between. The clypeal spines are rather long and fine; head hair A is multi-branched and plumose; B is bifid and finely frayed; C is simple with very sparse and fine fraying (not easily seen even under high magnification); d is short and bifid; e is about four-branched and short, and f is short and bifid. The antennae are distinctly spinose, the pre-apical bristles and terminal spines are long and very dark, and the shaft hair is strongly branched and plumose.

Terminal segments (Fig. 20). The lateral comb consists of 80 or more fringed scales (Fig. 21) in a roughly triangular group. Of the pentad hairs, the first has four to six plumose branches, the second is simple, the third has eight plumose branches, the fourth is simple, and the fifth has four or five plumose branches. The siphon is long, with six pairs of multi-branched ventro-lateral tufts. The pecten extends from the base to beyond the second ventro-lateral tuft and its spines are pectinate (Fig. 22). A distinct acus is present. The siphonal index is about 6. The saddle is a continuous ring with a bifid saddle hair. The dorsal sub-caudal tuft is characteristically as illustrated, with one long and three short hairs and the ventral sub-caudal tuft is single. The anal papillae are scarcely half the length of the saddle and there are two or three precratal tufts present on the ventral brush.

Although superficially resembling *C. sitiens* and *C. annulirostris*, this species is immediately distinct, in the larval stage, by its head hairs. Furthermore, the form of the dorsal sub-caudal tuft and the presence of precratal tufts are unusual features.

Habitat. The larvae were found breeding in a very shallow brackish swamp amongst a dense growth of tall reeds near Narrabeen, N.S.W.

Distribution.—This is a commonly found species in the vicinity of the type locality, but I have also seen specimens from Brisbane.

Note: In almost all respects, particularly in the male genitalia, the presence of pulvilli in the female, and larval characters, this species conforms to the definition of the genus *Culex*. In possessing post-spiracular bristles, it differs from all other known species of the genus *Culex*, and hence the adult might readily be misidentified generically.

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References.

- BONNE-WEPSTER, J., 1938.—*Geneesk. Tijdschr. Ned.-Ind.*, 78: 207.
 ———, and BRUG, S. L., 1937.—*Ibid.*, 77: 15-21.
 BRUG, S. L., 1925.—*Bull. ent. Res.*, 15: 345-7.
 ———, 1934.—*Ibid.*, 25: 514.
 ———, 1939.—*Tijdschr. v. Entom.*, 82: 101-2.
 EDWARDS, F. W., 1922.—*Bull. ent. Res.*, 13: 97-8.
 ———, 1923.—*Ibid.*, 14: 6.
 ———, 1924.—*Ibid.*, 14: 368.
 HILL, G. F., 1925.—*Proc. Roy. Soc. Vict.*, 37: 70.
 TAYLOR, F. H., 1914.—*Trans. ent. Soc. Lond.*, 1914: 186.